

I claim:

1) An instrument useful for extracting live hair follicles from mammalian skin tissue,

which device comprises:

5 a) a main body portion having a first end portion, a second end portion, and a longest length dimension, and further comprising a first bore centrally disposed therethrough, wherein the axis of said first bore runs parallel to said longest length dimension of said main body portion, and wherein said first bore comprises an inner surface within said main body;

10 b) a nipple end portion having a first end portion and a tip portion, and further including a second bore centrally disposed therethrough, wherein said first end portion of said nipple end portion is attached to said second end portion of said main body portion, and wherein said second bore comprises an inner surface within said nipple end;

15 c) a tubular punch means having a first end portion and a sharp end portion, wherein said tubular punch exists substantially in the form of a hollow cylinder having an interior space, and an outer diameter, and wherein said tubular punch means is slidably disposed within said second bore;

20 d) a stabilizer means disposed within said first bore and in contact with said tubular punch means; and

e) an adjustment screw comprising a head portion, a threaded outer surface, and an end, wherein said adjustment screw is disposed within said first bore such that its threaded outer surface is in effective mechanical contact with said inner surface within said main body, and wherein said end of said adjustment screw is disposed to be in selectively contactable with at least one element selected from the group of: said stabilizer and said tubular punch means.

2) An instrument according to claim 1 wherein said stabilizer includes a third bore disposed therethrough that is adapted to receive said tubular punch means such that said stabilizer means is coextensively disposed about said tubular punch means.

3) An instrument according to claim 2 wherein said stabilizer means and said tubular punch means are both slidably disposed as a unit within said first bore and said second bore respectively.

4) An instrument according to claim 2 wherein said stabilizer means is stationary within said first bore, and wherein said tubular punch means is slidably disposed within said second bore and said third bore.

5) An instrument according to claim 1 wherein said sharp end portion of said tubular punch means is flat, or is angled at any degree between about 30 degrees and about 90 degrees.

6) An instrument according to claim 1 wherein said adjustment screw includes a head portion and an end portion, and further comprises a fourth bore centrally disposed through its length.

5 7) An instrument according to claim 6 wherein said fourth bore extends from said head portion to said end portion.

8) An instrument according to claim 6 wherein said interior space within said tubular punch means is in fluid communication with said fourth bore disposed within said
10 adjustment screw.

9) An instrument according to claim 6 wherein said stabilizer includes a third bore disposed therethrough, and wherein said first end portion of said tubular punch means is disposed within said third bore through said stabilizer means such that said stabilizer
15 means and said tubular punch means are both slidably disposed as a unit within said first bore and said second bore respectively.

10) An instrument according to claim 1 wherein said first bore extends from said first end portion to said second end portion of said main body portion.

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11) An instrument according to claim 1 wherein said second bore extends from said first end portion to said tip portion of said nipple end portion.

12) An instrument according to claim 1 wherein said main body portion is substantially cylindrically shaped.

13) An instrument according to claim 1 wherein the tubular punch means has an outer
5 surface, and wherein the outer surface of said tubular punch means is in contact with the inner surface of said second bore disposed within said nipple end portion.

14) An instrument according to claim 1 wherein said nipple end portion is substantially cylindrically shaped.

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15) An instrument according to claim 1 wherein said first bore and said second bore have the same diameter.

16) An instrument according to claim 1 wherein the diameter of said second bore is less
15 than the diameter of said first bore.

17) An instrument according to claim 1 wherein the diameter of said second bore is greater than the diameter of said first bore.

20 18) An instrument according to claim 1 wherein the outer diameter of the tubular punch means is smaller than the inner diameter of said second bore.

19) An instrument according to claim 1 wherein said nipple end and main body comprise a single construct.

20) An instrument according to claim 1 wherein said sharp end of said tubular punch
5 means comprises a beveled edge.

21) An instrument according to claim 1 wherein said stabilizer means is comprised of an elastomeric material selected from the group consisting of: polyolefin homopolymers, polyolefin copolymers, thermoplastic vulcanizates, and thermoset elastomers.

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22) An instrument according to claim 1 wherein said tubular punch means is metallic.

23) An instrument according to claim 1 wherein said tubular punch means further includes an inner diameter which is substantially uniform along the entire length of said
15 tubular punch means.

24) An instrument according to claim 23 wherein the inner diameter of said tubular punch means is any diameter in the range of between about 0.5 millimeters and about 4.5 millimeters.

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25) An instrument according to claim 1 wherein said nipple end portion comprises a flat surface which is adapted to contact the skin of a patient, wherein the total surface area of said nipple end which contacts said patient is in the range of between about 5 square millimeters and about 25 square millimeters.

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26) An instrument according to claim 1 wherein the inner diameter of the tubular punch means is any diameter in the range between about 0.5 millimeters and about 4.5 millimeters.

10 27) An instrument according to claim 1 wherein the outer diameter of the tubular punch means is about 0.2 to about 0.3 millimeters greater than the inner diameter of said tubular punch means.

15 28) An instrument according to claim 1 wherein the length dimension of said nipple end is in the range of between about 0.03 millimeters and about 10 millimeters.

29) An instrument according to claim 1 wherein said second bore is about 0.1 millimeters smaller in diameter than the outer diameter of said tubular punch means.

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30) An instrument useful for extracting live hair follicles from mammalian skin tissue,
which device comprises:

a) a nipple end portion having a first end portion and a tip portion, said nipple end
5 portion having a longest length dimension and further including a bore disposed
therethrough whose axis is parallel to said longest length dimension, said bore
comprising an inner surface within said nipple end;

b) a tubular punch means which exists substantially in the form of a hollow
10 cylinder having two open ends, an interior space, and an outer diameter not
exceeding about 5.0 millimeters, wherein at least one end of said tubular punch
means is a cutting end which is capable of piercing the skin, said tubular punch
means further including an inner diameter between about 0.5 millimeters and 4.5
millimeters, which is substantially uniform along the entire length of said tubular
15 punch means, said tubular punch means being slidably disposed within said bore
such that its cutting end is capable of coinciding with said tip portion of said
nipple end portion when the tubular punch means does not protrude outward from
said tip portion; and

20 c) a means for adjusting the position of the tubular punch means within said bore,
including control of the amount which said cutting end protrudes from said tip
portion of said nipple end portion.

31) An instrument according to claim 30 wherein said nipple end portion comprises a flat surface which is adapted to contact the skin of a patient, wherein the total surface area of said nipple end which contacts said patient is in the range of between about 5 square
5 millimeters and about 25 square millimeters.

32) An instrument according to claim 30 wherein said means for adjusting the position of the tubular punch means within said bore comprises a threaded screw having an end portion which is in effective mechanical contact with said tubular punch means, and a
10 stationary portion capable of engaging with the threads on said screw, wherein said stationary portion is in effective mechanical contact with said nipple end portion.

33) A process for extracting a live hair follicle from a mammalian subject comprising the steps of:

15 a) providing a tubular punch means which exists substantially in the form of a hollow cylinder having an axis, a first open end, a second open end, an interior space, and an outer diameter not exceeding about 5.0 millimeters, wherein said first end of said tubular punch means is a cutting end which is capable of piercing the skin;

20 b) contacting said cutting end to the skin of a mammalian subject, such that a hair on the skin of said mammalian subject is disposed within said interior space, and such that the axis of said cylinder is disposed at a first angle with respect to the

surface of the skin of said subject, wherein said first angle is between about 85 degrees and 95 degrees;

c) causing said cutting end to penetrate the skin of said subject to a depth of at least 0.05 millimeters but no greater than about 0.3 millimeters;

d) tilting said tubular punch means so that it is disposed at a second angle with respect to the surface of the skin of said subject, which second angle is selected from the group consisting of: any angle between about 20 degrees and about 70 degrees and the angle of hair growth;

e) causing said cutting end to further penetrate the skin of said subject to a depth of at least 2 millimeters but no greater than about 7 millimeters while maintaining said tubular punch means at said second angle with respect to the surface of the skin of said subject and while maintaining said hair within said interior space so as to cause to follicle(s) within which said hair grows to be disposed within said interior space; and

f) removing said follicle from said subject.

34) A process according to claim 33 wherein said first angle is about 90 degrees and wherein said second angle is about 56 degrees.

35) A process according to claim 33 wherein said step of removing the follicle from the subject comprises applying a vacuum to said second end of said tubular punch means.

5 36) A process according to claim 33 wherein said step of removing the follicle from the subject comprises cutting said follicle from said subject.

37) A process according to claim 33 wherein said second angle coincides with the angle of growth of said hair with respect to the surface of the skin of said subject.